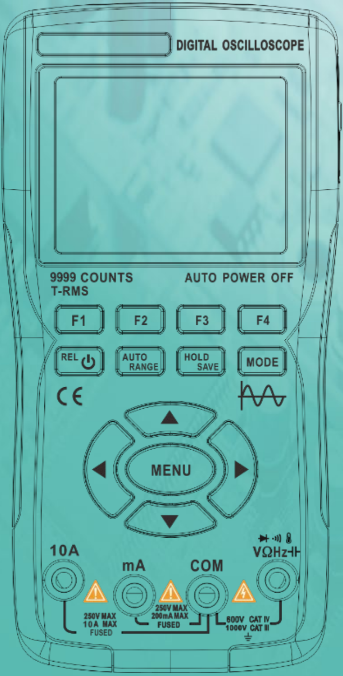
User Manual



DIGITAL OSCILLOSCOPE
9999 COUNTS
T-RMS
AUTO POWER OFF
F1
F2
F3
F4
REL
AUTO RANGE
HOLD SAVE
MODE
MENU
10A
mA
COM
VΩHz
250V MAX 10A MAX FUSED
250V MAX 200mA MAX FUSED
600V CAT IV 1000V CAT III

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Customers enjoy one-year warranty from the date of purchase.

This warranty does not cover fuses, disposable batteries, damage from misuse accident, neglect, alteration, contamination, or abnormal conditions of operation or handling, including failures caused by use outside of the product's specifications, or normal wear and tear of mechanical components.

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Introduction

The handheld oscilloscope multimeter adopts double-injection molding technology, with beautiful appearance design, small size, easy to carry, and flexible operation; the function button menu interface is clear and intuitive, the screen adopts 2.8-inch IPS full-view color screen, and the multimeter is 9999 counts; the product combines the oscilloscope and multimeter function as one, with superior performance and powerful functions, and can be used in various measurement scenarios to meet more measurement needs of users.

Safety Instructions

To avoid possible electric shock, fire, and personal injury, please read the safety precautions before use. Use the product only for its intended purpose, otherwise the protection provided by the product may be impaired.
Please check the case for cracks or plastic defects before using the product. Please double check the insulator near the input port.
Please follow this "User Manual", use the correct input port and the correct gear setting, and measure within the range specified in this "User Manual".
Do not use this product around explosive gases and vapors or in humid environments.
Keep your fingers behind the guard of the test lead probe.

When this product is connected to the circuit to be tested, please do not touch the unused input port.

Disconnect the test lead and the circuit before changing the measuring mode .

When the DC voltage to be measured is higher than 36V, or the AC voltage is higher than 25V, it may cause serious injury to the human body, and the user should pay attention to avoid electric shock.

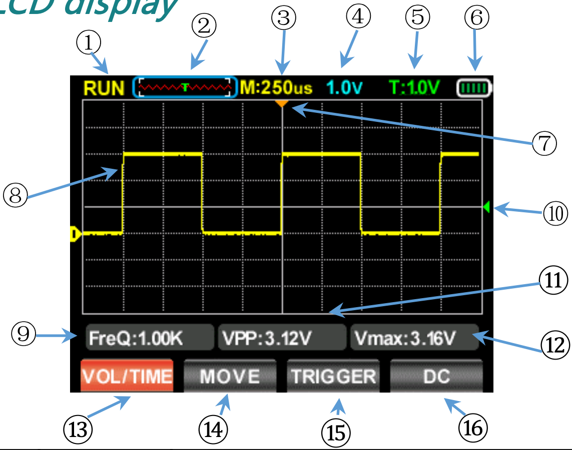
Please select the correct test gear and range to avoid instrument damage or personal injury.

Do not use this product with the front or back cover opened. When the battery voltage is low, it may affect the accuracy of the test results, please charge it in time.

- The ground wire of the probe is the same as the GND, please do not connect the ground wire to a high-voltage power supply when charging the USB cable， otherwise it will damage the product or cause serious injury to the users.
- When using an oscilloscope probe to measure voltages higher than (AC25V, DC36V), please ensure that the USB protective cover of the product is tightly closed to avoid human contact with exposed metal parts, otherwise it may cause human injury.

Oscilloscope mode main interface instruction

LCD display



①	Running status display	RUN: Waveform automatic acquisition status WAIT: Normal trigger mode, flashing waiting for trigger signal T'D: Captured trigger waveform data STOP: Lock the current waveform and stop the acquisition
②	Time base	Displays the current time base position within the memory depth
③	Time base scale	Display the currently set horizontal time base scale value
④	Voltage scale	Display the currently set vertical voltage scale value

⑤	trigger level	Display the currently set trigger voltage value
⑥	battery power status	Display the current battery power status and charging display
⑦	Horizontal Cursor	Displays the horizontal time base position of the current trigger
⑧	Waveform	The large screen displays the state of the collected waveform
⑨	FerQ:	Display the frequency value of the collected signal
⑩	Vertical cursor	Display the current triggered vertical voltage position
⑪	VPP:	Display the peak-to-peak voltage value of the collected signal
⑫	Vmax:	Display the maximum voltage value of the collected signal
⑬	Voltage time base menu(VOL/TIME)	Complete the voltage timely base setting in this menu ● Voltage setting method: press the up key to increase the voltage amplitude, and press the down key to reduce the voltage amplitude Adjustable range: 20mV/div - 10V/div ● Time base setting method: press the panel left key to enlarge the time base, press the panel right key to narrow the time base; adjustable range: 50ns/div - 20s/div
⑭	Waveform movement (MOVE)	Press the up key and the down key to adjust the up and down positions of the waveform, and press the left key and right key to adjust the left and right positions of the waveform.
⑮	Trigger cursor (TRIGGER)	Press the up key and the down key to adjust the position of the trigger cursor.
⑯	Coupling mode (AC DC)	Press F4 to switch the AC-DC coupling mode

Panel keys instruction







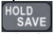
F1-F4 key: corresponding to the function menu displayed on the screen, select the corresponding function through the key, as shown in the figure above.



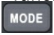
Power button: Press and hold the power button for 2 seconds to switch on and off; in multimeter mode, press the power button to enter relative value (REL) measurement mode.



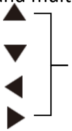
AUTO/ RANGE key: short press this key on the oscilloscope interface to automatically obtain the measurement waveform; short press on the multimeter interface to switch to manual range.



HOLD/SAVE key: Short press on the oscilloscope interface for STOP/RUN function, long press to save the measured waveform data; short press on the multimeter interface for data hold/cancel hold function.



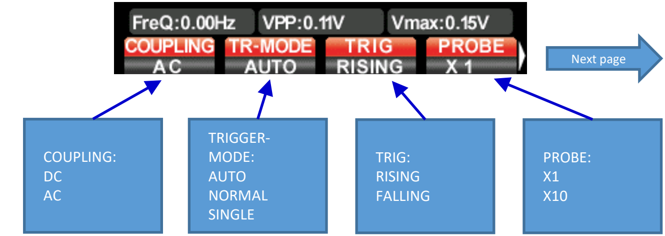
MODE key: Press this key to switch between oscilloscope mode and multimeter mode.

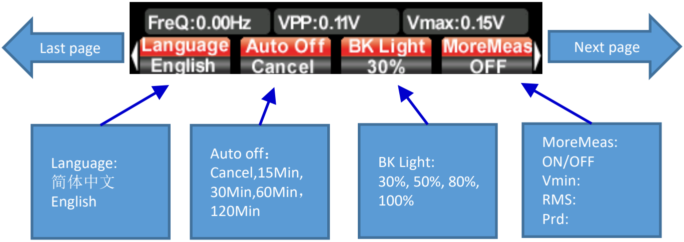

Direction keys: The up, down, left, and right direction keys are correspondingly used to progressive adjust related setting parameters, moving cursor position and menu selection.

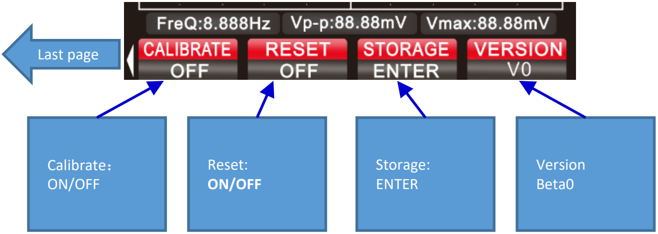
● 

MENU key: Press MENU, the system function expansion menu will pop up on the screen, with a total of 3 pages, as follows:

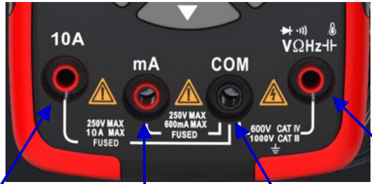
MENU extended munu interface description







Input/Output ports



Current positive transmission port, the maximum input current is 10A

mA current input positive input port, the maximum input current is 200mA

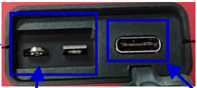
COM common port

Voltage, resistance, capacitance, diode, continuity, frequency, temperature input



OPEN





Oscilloscope probe input terminal, maximum input voltage: 400V (DC+AC peak value)

Square wave signal output metal port: Do not touch this metal terminal with your hands during measurement to avoid injury

The round port is the ground terminal, And the square port is the signal terminal, constant output 3V/1KHZ

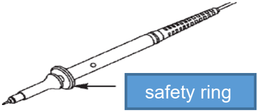
USB port Communicate with the computer and charge the battery through the TYPE-C data cable

Oscilloscope function indroduction

Probe check

➢ Safety

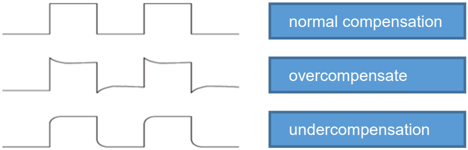
When using the probe, in order to avoid electric shock, keep your fingers behind the safety ring on the probe body, and do not touch the metal part on the top of the probe when the probe is connected to a high-voltage power supply; the measured voltage must not exceed the probe specification (this instrument comes with the probe and probe specifications).



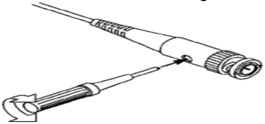
➢ Manual probe offset

When connecting the probe to the oscilloscope for testing for the first time, it is recommended to check the compensation as follows. Uncompensated or offset compensated probes can cause measurement errors. To adjust probe compensation, please follow the steps below:
1, After power on, connect the probe to the signal input terminal, input 4V/1KHz square wave signal

2,After connecting, press the AUTO key on the panel to check the waveform display status



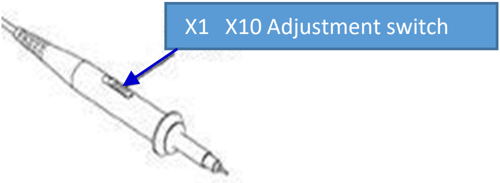
3, If it is necessary to cooperate with the adjustment, you can adjust the capacitance on the probe to change the compensation state; the adjustment tool is the accessory adjustment rod that comes with the probe or a suitable non-metallic handle adjustment rod. The adjustment method is as shown in the figure below



➢ Probe attenuation setting

The probe attenuation coefficient setting will affect the vertical scale reading of the signal. Make sure that the multiple of the attenuation switch on the probe matches the multiple of the probe attenuation option in the system settings of the oscilloscope. When the multiple of the switch is set to X1, the multiple of the oscilloscope is set to X1, and when the multiple of the switch is set to X10, the multiple of the oscilloscope is set to X10.

Remarks: When the probe is set to y1, the probe marked with a specifi cation of 6M2/X1 will limit the bandwidth of the oscilloscope to 6MM inp ut. To use the full band of the oscilloscope, make sure to set the switch to 10 or use a probe with a higher specification.



Oscilloscope function introduction

Auto settings

When encountering uncertain waveforms or avoiding tedious manual settings during measurement; press the AUTO button, and the oscilloscope will automatically identify the waveform type (sine or square wave) and adjust the control mode to accurately display the waveform of the input signal.

Vertical systems

The vertical system can set the waveform voltage amplitude, scale size and position.

1. Vertical voltage/scale setting

On the main interface of the oscilloscope, press F1 to the voltage time base menu, press the up direction key to increase the voltage setting value, and press the down direction key to decrease the voltage setting value.

Adjustment range when the probe attenuation is set to X1: 20mV/div-10V/div

Adjustment range when the probe attenuation is set to X10: 200mV/div-100V/div

2. vertical position

On the main interface, press F2 to the waveform movement menu, press the up direction key to move the waveform position up, and press the down direction key to move the waveform position down.

Horizontal system

Press F1 on the main interface to the voltage time base menu

1. Horizontal scale: Press the left and right direction keys to change the horizontal scale (time base). When changing the horizontal scale, the waveform will be enlarged or reduced relative to the center of the screen. The right direction key is to zoom out the time base, and the left direction key is to zoom in on the time base.

2. Horizontal position: Press F2 on the main interface to the waveform movement menu, and press the left and right direction keys to adjust the horizontal position of the waveform to move left and right. When adjusting, the horizontal trigger cursor will also move accordingly.

3.Rolling mode: when the horizontal time base is slower than 100ms/div, the oscilloscope automatically enters the rolling mode; the trigger and horizontal position settings are not controlled in the rolling mode; the waveform is scrolled from left to right; the rolling mode is suitable for low-speed signals and can be Observe the waveform change track for a long time according to the measurement requirements.

Triggering system

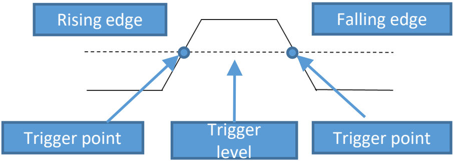
Usually in the oscilloscope measurement, it is necessary to obtain a specific or prominent difference (continuous or instantaneous) waveform in the circuit for observation and analysis. The condition can be set through the triggering system. When the collected signal meets the set condition, the system will automatically obtain the current waveform and display it on the screen.

1. Trigger cursor setting: Press F3 on the main interface to the trigger cursor menu, press the up and down direction keys to adjust the up and down position of the trigger cursor, and the trigger level value at the upper right corner of the screen will change accordingly (the trigger level value is a vertical waveform location as a reference point).

2. Trigger mode: Press MENU to expand the pop-up menu, press F2 to the trigger mode, and there are three types as follows.

- Auto： Automatic triggering will collect and refresh waveform records in real time, and will not retain waveforms.
- Normal: When the amplitude of the collected signal reaches the set trigger level value, the trigger system will keep the waveform locked and displayed on the screen, and the oscilloscope is still collecting continuously. When it is triggered again, the waveform on the screen will be updated to the current waveform again, which is continuous triggering.
- Single: When the collected signal amplitude reaches the set trigger level value, the trigger system will keep the waveform locked and displayed on the screen, the waveform acquisition is completed and the STOP state is displayed, and the oscilloscope stops signal acquisition; if you want to trigger again, press HOLD to cancel STOP, enter the state to be triggered.

3.Trigger edge: Press MENU to pop up an extended menu, and then press F3 to select; set the two trigger modes of rising edge and falling edge, as shown in the figure below.



Rising edge trigger: the trigger system identifies the signal amplitude during the rising process. When the amplitude reaches the trigger level, the trigger acts.
Falling edge trigger: the trigger system identifies the signal amplitude of the falling process, and when the amplitude reaches the trigger level, the trigger acts.

Measurement

Automatic measurement: When measuring unknown signal waveforms, press the AUTO key, and the measurement system will automatically identify and adjust the waveform amplitude and time base, and display the matching waveforms on the screen.
Manual measurement: Manually set the predicted waveform voltage, time base, cursor position, trigger, coupling mode, probe attenuation and other parameters; the measurement circuit is connected to the oscilloscope probe, and the observed waveform and reading related measurement values.
Measured value: Press MENU to pop up an extended menu, then press the right direction key to the next menu, then press F4 to choose to open or close the measured value; the measured values FreQ:, VPP:, Vmax: are always displayed and not affected Switch control; Vmin:, RMS:, Prd: can be set to display and hide according to requirements.

Oscilloscope function introduction

How to save measured waveforms

When you need to save the measured waveform, press and hold the 

button for 2 seconds, and release the button when the prompt "

" pops up on the screen, the oscilloscope will automatically save the current measured waveform data, and save it in the flash with a serial number in the form of a picture.

How to View and Acquire saved Waveforms

Press the MENU key to pop up an extended menu, then press the right direction key to enter the next page menu, press the right arrow key again to enter the third page menu, press the F3 key to save the data to the Flash.

Connect the TYPE-C data cable to connect the oscilloscope to the computer, click the USB disk, open the pic folder to view, or download the waveform to the computer for easier analysis.

Press F2 to return to the measurement interface.

Additional function

➢ Language settings

Press the MENU key to pop up an extended menu, then press the right arrow key to enter the next menu, press the F1 key, and choose two language modes, Simplified Chinese or English, according to personal habits.

➢ Automatic shut-down

Press the MENU key to pop up an extended menu, and then press the right arrow key to enter the next menu. Press F2 key to select the automatic shutdown time; according to the frequency of use, you can choose 15 minutes, 30 minutes, 60 minutes, 120 minutes, unlimited . If you use it temporarily for a short time, it is recommended to choose 15 minutes to automatically shut down to save power; if you use it continuously for a long time, you can choose 120 minutes or unlimited time.

Oscilloscope function introduction

➢ Backlight brightness

Press the MENU key to pop up an extended menu, and then press the right arrow key to enter the next menu. Press F3 key to select the brightness adjustment of the screen backlight; the brightness level can be set to 30%, 50%, 80%, and 100%; indoor use is recommended to set to 30% brightness, it can also be adjusted to a more comfortable brightness according to different sensory environments.

➢ Baseline calibration

Press the MENU key to pop up an extended menu, then press the right arrow key to enter the next page menu, and press the arrow right key again to enter the last page menu, press F1 for baseline calibration. When baseline zero offset is found because the ambient temperature deviation is big or the instrument has not been used for a long time, you can perform baseline calibration; please pay attention to the following two points when calibrating:

1. Do not connect the probe and input signal during point calibration, otherwise it will cause calibration deviation or damage the instrument.

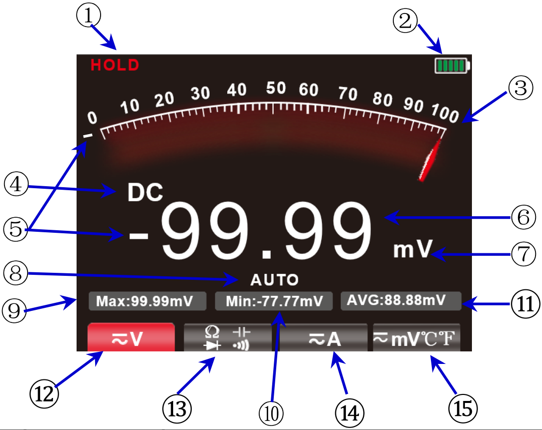
2. Do not do other operations during the calibration process until it prompts that the calibration is complete.

Reset

Press the MENU key to pop up an extended menu, then press the right direction key to enter the next page menu, press the right direction key again to enter the last page menu, press the F2 to format, and the oscilloscope will reset to defaults and shut down; If you need to turn on the instrument , press and hold the power button to turn it on.

Multimeter mode function introduction

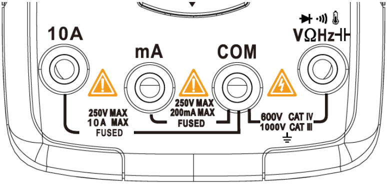
LCD display (Press hold)



①	HOLD	Press HOLD to hold the current displayed data
②	Battery power status	Display the current battery power status and charging display
③	Analog pointer	The analog pointer on the dial changes with the measurement data of the main display, and the pointer indicates the corresponding scale position
④	Measurement symbol display	Display the current corresponding measurement type symbols, respectively AC, DC, resistance, capacitance, diode, buzzer symbols

⑤	Negative	When there is a negative value, the screen will display a negative sign prompt
⑥	Main display	Display the measured value of the multimeter, the maximum display is 9999 counts
⑦	Unit symbol	Displays the unit symbol of the measured data
⑧	Measurement mode	Automatic range (AUTO): the multimeter automatically selects the appropriate measure range Manual measurement (MANU): press the RANGE key, you can choose to switch the specified measure range
⑨	Max:	Displays the maximum reading when measuring
⑩	Min：	Displays the minimum reading when measuring
⑪	AVG： Hz: Temp:	Displays the average value during DC voltage, resistance, and capacitance measurements Display AC frequency (Hz) reading value during AC voltage current measurement Displays Fahrenheit (℉) readings during temperature tests
⑫	Voltage gear	Press F1 to select the voltage measurement gear, and then press F1 to switch AC/DC
⑬	Resistors, capacitors, diodes,continu ity	Press F2 to the resistance measurement gear On the resistance measurement interface, press F2 to enter the on-off gear On the on-off interface, press F2 to enter the diode gear On the diode interface, press F2 to enter the capacitor gear
⑭	Current mode	Press F3 to the current measuring mode on the current measuring interface , press F4 , the screen displays mA mode
⑮	mV, temperature measurement	Press F4 in the non-current test interface to enter the DC millivolt voltage measurement , then press F4 again to enter the AC millivolt voltage measurement, and then press F4 again to enter the temperature measurement.

Multimeter input terminal



10A	Input port for current measurement (≤9.999A)
mA	Input port for current measurement (≤99.99mA)
COM	Common (return) port for all measurements
V Ω Hz	Input ports for the following measurements: 1. AC/DC voltage 2. Resistance 3. Electrical appliances 4. Frequency 5. Temperature 6. On and off 7. Diodes

Measurement methods
Measuring AC and DC voltage

1. Insert the black test lead into the COM terminal, and the red test lead into the VΩHz terminal.
2. To measure a voltage less than 99.99mV, press F4 to mV range, and press it twice to enter the AC mV range. To measure a voltage more than 99.99mV, press F1 to DC voltage range , and press F1 twice to AC voltage range.
3. Use the probe to contact the correct test point on the circuit
4. Read the voltage value shown on the display screen.

- The measured voltage should not exceed the rated maximum measure value, otherwise the instrument may be damaged and personal safety may be endangered.
- When measuring high voltage circuits, it is necessary to avoid touching the high voltage circuits.

Measure the AC and DC current

1. Insert the black test lead into the COM port, and the red test lead into the 10A port or the mA port(choose which port to use according to the maximum test value of the two ports and the estimated value of the current to be tested); press F3 to the current mode menu; after entering the current mode menu, F4 key corresponds to mA current.
2. Press the corresponding menu key again to switch between DC and AC.

3. Disconnect the circuit path to be tested, connect the test leads in series to the circuit and turn on the power supply. Read the current value shown on the display screen.

- The measured current cannot exceed the rated maximum measure value, otherwise the instrument may be damaged and personal safety may be endangered.
- If the magnitude of the current to be tested is unknown, the test should be judged at the A port first, and then the test port and gear should be selected according to the displayed value.
- It is strictly forbidden to input voltage in this current gear .

Measuring resistance

1. Insert the black test lead into the COM port, and the red test lead into the VΩHz port.
2. Press F2 to enter the resistance gear.
3. Use the probe to touch the test point of the circuit.
4. Read the measured resistance value on the display.

- Before measuring resistance, make sure that all power supplies of the circuit under test are turned off and all capacitors are fully discharged.
- It is strictly forbidden to input voltage in this current gear .

Measuring continuity

1. Insert the black test lead into the COM port, and the red test lead into the VΩHz port.
2. In the resistance mod, Press F2 to enter the continuity mode.

3. Connect the probes of the test leads to the two points of the circuit to be tested. If the built-in buzzer sounds, it indicates that there is a short circuit.

Measuring diode

1.Press F2 in the on-off gear to enter the diode gear

2.Connect the probe of the red test lead to the positive of the diode to be tested, and the probe of the black test lead to the negative of the diode to be tested, and then read the forward voltage displayed on the display. If the polarity of the test lead is opposite to that of the diode, or the diode is damaged, the screen will display as 0L

- It is strictly forbidden to input voltage in the state of on-off and diode gear.
- Disconnect power to the circuit and discharge all high voltage capacitors before testing.

Measuring capacitance

1. Insert the black test lead into the COM port, and the red test lead into the VΩHz port.
2. Press F2 in the diode gear to enter the electronic gear.
3. Connect the red test lead probe to the positive pole of the capacitor under test, and the black test lead probe to the negative pole of the capacitor under test.
4. After the reading is stable, read the capacitance value displayed on the screen.

- Disconnect power to the circuit and discharge all high voltage capacitors before testing.

Measuring temperature

Connect the black test lead to the COM Terminal and the red lead to the VΩHz Terminal.

1. Push F4 three times to enter the Temperature Mode. Both displays will show room temperature; the primary measurement display will show Celsius while the secondary measurement display will show Fahrenheit.
2. Touch the probes to the desired test points.
3. Read the measured temperature on the display.

- Do not input voltage in this mode.

Maintenance

Beyond replacing batteries and fuses, do not attempt to repair or service the product unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

Clean the Product

Wipe the product with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

*Remove the input signals before you clean the product.

Charging batteries

When the power display symbol “ ” appears in the upper right corner of the screen, it should be charged in time, and the steps are as follows:

1. The TYPE-C data cable is connected to the DC 5V output adapter for charging.
2. The TYPE-C data cable is connected to the USB port of the computer for charging.
3. In charging, the screen displays " " symbol.
4. When fully charged, the screen will display " " symbol.

5. During the charging process of the instrument, the built-in red light "

" of the power button will be on, and the light will be flashing if no battery is installed in the instrument.

Battery storage

If the instrument is not used for a long time (such as more than 6 months), it should be charged with 50%-70% of the electricity, and taken out and stored in a cool and dry environment; if the lithium battery is rusted, leaked, bulged, etc., it should be taken out immediately and discarded.

Replace the Batteries

The lithium battery of the instrument can be recharged and used repeatedly, but it is still a consumable product. If the standby time is found to be seriously shortened, it needs to be replaced with the same type of 18650 lithium battery; the replacement method refers to the steps of replacing the fuse.
Note: When installing the battery, be careful not to reverse the positive and negative polarities.

Replace the Fuses

When a fuse is blown or do not work properly, it shall be replaced as below:

1. Remove the test leads and turn off the product before replacing the fuse.
2. Loosen the four screws on the back cover and the screw on the battery door, then remove the battery door and the back cover.
3. Replace the fuse with a new fuse of the same type.
4. Place the back cover and the battery door back and fasten the screws.

Specifications

General Specifications	
Display（LCD）	9999 Counts
Ranging	Auto/Manual
Material	ABS+TPE
Update Rate	3 Times/Second
Ture RMS	√
Data Hold	√
Backlight	√
Low Battery Indication	√
Auto Power Off	√

Mechanical Specifications	
Dimension	177*89*40mm
Weight	345g（NO BATTERY）
Battery Type	18650 Battery * 1
Warranty	One year

Environmental Specifications		
Operating	Temperature	0~40℃
	Humidity	＜75%
Storage	Temperature	-20~60℃
	Humidity	＜80%

Multimeter Specifications

Function	*Range*	*Resolution*	*Accuracy*
DC Voltage (V)	999.9mV	0.1mV	±(0.5%+3)
	9.999V	0.001V	
	99.99V	0.01V	
	999.9V	0.1V	
DC Voltage (mV)	9.999mV	0.001mV	
	99.99mV	0.01mV	
AC Voltage (V)	999.9mV	0.1mV	±(1.0%+3)
	9.999V	0.001V	
	99.99V	0.01V	
	750.0V	0.1V	
AC Voltage (mV)	9.999mV	0.001mV	
	99.99mV	0.01mV	
*Frequency response of ACV: 40Hz-1kHz			

Function	*Range*	*Resolution*	*Accuracy*
DC Current (A/mA)	9.999A	0.001A	±(1.0%+3)
	999.9mA	0.1mA	
DC Current (µA/mA)	99.99mA	0.01mA	±(0.8%+3)
	9999µA	1µA	
AC Current (A)	9.999A	0.001A	±(1.2%+3)
	999.9mA	0.1mA	
AC Current (µA/mA)	99.99mA	0.01mA	±(1.0%+3)
	9999µA	1µA	
Frequency response of AC Current: 40Hz-1kHz			
Resistance	99.99Ω	0.01Ω	±(1.0%+3)
	999.9Ω	0.1Ω	±(0.5%+3)
	9.999kΩ	0.001kΩ	
	99.99kΩ	0.01kΩ	
	999.9kΩ	0.1kΩ	
	9.999MΩ	0.001MΩ	±(1.5%+3)
	99.99MΩ	0.01MΩ	±(3.0%+5)

Function	*Range*	*Resolution*	*Accuracy*
Capacitance	9.999nF	0.001nF	±(5.0%+20)
	99.99nF	0.01nF	±(2.0%+5)
	999.9nF	0.1nF	
	9.999µF	0.001µF	
	99.99µF	0.01µF	
	999.9µF	0.1µF	
	9.999mF	0.001mF	±(5.0%+5)
	99.99mF	0.01mF	
Frequency (Measures only to 100kHz under the ACV setting)	99.99Hz	0.01Hz	±(0.1%+2)
	999.9Hz	0.1Hz	
	9.999kHz	0.001kHz	
	99.99kHz	0.01kHz	
	999.9kHz	0.1kHz	

Function	*Range*	*Resolution*	*Accuracy*
Temperature	(-20~1000)℃	1℃	±(2.5%+5)
	(-4~1832)℉	1℉	
Diode	√		
Continuity	√		

Oscilloscope Specifications

characteristic		*Instructions*
Bandwidth	10MHZ	
Sampling	Sampling method	real-time sampling
	real-time sample rate	48MSa/s
Channels	1	
Input	input coupling	AC/DC
	input resistance	1MΩ,@16pf
	Probe attenuation	X1, X10
	Max input voltage	150V (DC+AC peak)
Horizontal	Sample rate range	1.5Sa/s - 48MSa/s
	Waveform interpolation	(sinx)x
	Sweep speed range	50ns/div - 20s/div
	Time Base Accuracy	20ppm
	record length	Max 64Kbyte
Vertical	sensitivity	20mV/div - 10V/div
	Displacement range	4 cells (positive and negative)
	Analog Bandwidth	10MHZ
	low frequency response	>10HZ
	Rise Time	<10ns
	DC Gain Accuracy	±3%
Measurement	automatic measurement	Period, frequency, peak-to-peak value, maximum value, minimum value, effective value
trigger	trigger method	auto, normal, single
	trigger edge	rising edge, falling edge

